

CLAIMS

[C001] 1. An X-ray detector assembly comprising:

a detector substrate;

a scintillator material disposed on a detector matrix array disposed on said detector substrate;

an encapsulating coating disposed on said scintillator material;

a moisture resistant cover disposed over said detector substrate and said encapsulating coating; and

an adhesive material disposed between said detector substrate and said moisture resistant cover so as to form a moisture vapor barrier;

wherein said adhesive material is disposed so that it is not in contact with said encapsulating coating.

[C002] 2. The X-ray detector assembly as in claim 1, wherein said scintillator material has a plurality of scintillator needle structures, and wherein said encapsulating coating is deposited between said plurality of scintillator needle structures all the way to a bottom and along all sidewalls of each of said scintillator needle structures, so as to mold over said scintillator material.

[C003] 3. The X-ray detector assembly as in claim 1, wherein said encapsulating coating comprises at least one polymer comprising para-xylylene moieties as structural units.

[C004] 4. The X-ray detector assembly as in claim 3, wherein said para-xylylene moieties are comprised of structural units of unsubstituted para-xylylene moieties.

[C005] 5. The X-ray detector assembly as in claim 3, wherein said para-xylylene moieties are comprised of structural units of substituted para-xylylene moieties.

[C006] 6. The X-ray detector assembly as in claim 3, wherein said para-xylylene moieties are comprised of structural units of both substituted and unsubstituted para-xylylene moieties.

[C007] 7. The X-ray detector assembly as in claim 1, wherein said encapsulating coating is selected from a group consisting of a mono-chloro-poly-para-xylylene material, a di-chloro-poly-para-xylylene material, a poly-para-xylylene material, and combinations thereof.

[C008] 8. The X-ray detector assembly as in claim 3, said encapsulating coating further comprising:

a first encapsulating coating tier disposed on said scintillator material and a detector substrate first portion;

an inner reflective tier disposed on said first encapsulating coating tier; and

a second encapsulating coating tier disposed on said inner reflective tier .

[C009] 9. The X-ray detector assembly as in claim 8, wherein:

said first encapsulating coating tier is selected from a group of a mono-chloro-poly-para-xylylene material, a di-chloro-poly-para-xylylene material, a para-xylylene material, and combinations thereof;

said inner reflective tier comprises silver (Ag);

said second encapsulating coating tier is selected from a group of said mono-chloro-poly-para-xylylene material, said di-chloro-poly-para-xylylene material, said para-xylylene material, and said combinations thereof.

[C010] 10. The X-ray detector assembly as in claim 8, wherein:

said first encapsulating coating tier has a thickness in a range between about 0.7 microns and about 1 micron;

said inner reflective tier has a thickness in a range between about 0.05 microns and about 0.12 microns;

said second encapsulating coating tier has a thickness in a range between about 1 micron and about 12 microns.

[C011] 11. The X-ray detector assembly as in claim 3, wherein said adhesive material is disposed between a detector substrate adhesive bond area and a moisture resistant cover adhesive bond area, so that no said encapsulating coating is disposed therebetween.

[C012] 12. The X-ray detector assembly as in claim 11, wherein said detector substrate adhesive bond area has a width with a range between about 3050 microns and about 3810 microns and said moisture resistant cover adhesive bond area has a width with a range between about 3050 microns and about 3810 microns.

[C013] 13. The X-ray detector assembly as in claim 1, wherein said moisture resistant cover is disposed over said encapsulating coating so that a gap is disposed between said moisture resistant cover and said encapsulating coating, where said gap has a width in a range between about 25 microns and about 125 microns.

[C014] 14. The X-ray detector assembly as in claim 1, further comprising:

an outer barrier, wherein said outer barrier is disposed on an external adhesive material surface of said adhesive material, said moisture resistant cover bond area and said detector substrate adhesive bond area.

[C015] 15. The X-ray detector assembly as in claim 14, wherein said outer barrier is selected from a group consisting of a boron nickel alloy, Al, Pd, Ti, Ag, and an inorganic insulation material.

[C016] 16. The X-ray detector assembly as in claim 1, said X-ray detector assembly further comprising:

a scintillator outer edge disposed around the circumference of said scintillator material;

said encapsulating coating being disposed on said scintillator material so as to not overlie said scintillator outer edge.

[C017] 17. The X-ray detector assembly as in claim 1, said X-ray detector assembly further comprising:

a reflective layer disposed on said encapsulating coating.

[C018] 18. The X-ray detector assembly as in claim 17, wherein said moisture resistant cover is disposed over said reflective layer so that a gap is disposed between said moisture resistant cover and said reflective layer, where said gap has a width in a range between about 25 microns and about 125 microns.

[C019] 19. The X-ray detector assembly as in claim 17, wherein said reflective layer is selected from a group consisting of silver (Ag), gold (Au), titanium dioxide (TiO₂) and a polyester film with a layer of a pressure sensitive adhesive, and combinations thereof.

[C020] 20. The X-ray detector assembly as in claim 17, wherein said reflective layer comprises silver (Ag) with a thickness in a range between about 0.05 microns and about 0.15 microns.

[C021] 21. The X-ray detector assembly as in claim 1, wherein said scintillator material comprises a cesium iodide (CsI) material disposed in a CsI needle structure.

[C022] 22. The X-ray detector assembly as in claim 21, wherein said CsI needle structure further comprises a thallium doping material.

[C023] 23. The X-ray detector assembly as in claim 1, wherein said moisture resistant cover comprises a graphite/resin core, encapsulated by an aluminum foil.

[C024] 24. The X-ray detector assembly as in claim 3, wherein said adhesive material comprises a thermoset epoxy material with a curing temperature of less than about 100 degrees C.

[C025] 25. The X-ray detector assembly as in claim 24, wherein said adhesive material further comprises a first epoxy layer and a second epoxy layer; wherein said first epoxy layer is disposed on a detector substrate adhesive bond area so that no said encapsulating coating is disposed therebetween, wherein said second epoxy layer is disposed on said first epoxy layer so that no said encapsulating coating is disposed therebetween, wherein said second epoxy layer is disposed on a moisture resistant cover adhesive bond area so that no said encapsulating coating is disposed therebetween, wherein said first epoxy layer, said second epoxy layer, said detector substrate and said moisture resistant cover are disposed to form a moisture vapor dual epoxy barrier.

[C026] 26. The X-ray detector assembly as in claim 25, further comprising:

an outer barrier, wherein said outer barrier is disposed on an external first epoxy layer surface of said first epoxy layer, an external second epoxy layer surface of said second epoxy layer, a portion of said moisture resistant cover bond area and a portion of said detector substrate adhesive bond area.

[C027] 27. The X-ray detector assembly as in claim 26, wherein said outer barrier is selected from a group consisting of a boron nickel alloy, Al, Pd, Ti, Ag, and an inorganic insulation material.

[C028] 28. The X-ray detector assembly as in claim 24, wherein said adhesive material further comprises three epoxy layers; wherein a first epoxy layer is disposed on a detector substrate adhesive bond area so that no said encapsulating coating is disposed therebetween, wherein said second epoxy layer is disposed on first epoxy layer so that no said encapsulating coating is disposed therebetween, wherein a third epoxy layer is disposed on said second epoxy layer so that no said encapsulating coating is disposed therebetween, and wherein said third epoxy layer is disposed on a

moisture resistant cover adhesive bond area so that no said encapsulating coating is disposed therebetween, wherein said first epoxy layer, said second epoxy layer, said third epoxy layer, said detector substrate and said moisture resistant cover are disposed to form a moisture vapor triple epoxy barrier.

[C029] 29. The X-ray detector assembly as in claim 28, further comprising:

an outer barrier, wherein said outer barrier is disposed on an external first epoxy layer surface of said first epoxy layer, an external second epoxy layer surface of said second epoxy layer, an external third epoxy layer surface of said third epoxy layer, a portion of said moisture resistant cover bond area and a portion of said detector substrate adhesive bond area.

[C030] 30. The X-ray detector assembly as in claim 29, wherein said outer barrier is selected from a group consisting of a boron nickel alloy, Al, Pd, Ti, Ag, and an inorganic insulation material.

[C031] 31. The X-ray detector assembly as in claim 25, wherein said encapsulating coating is disposed so as to not extend over interface between respective layers of said two step thermoset epoxy material.

[C032] 32. An X-ray detector assembly comprising:

a detector substrate;

a scintillator material disposed on a detector matrix array disposed on said detector substrate;

an encapsulating coating disposed on said scintillator material and disposed on a detector substrate first portion;

said encapsulating coating being disposed so as to not extend over a detector substrate second portion; and

a reflective layer disposed on said encapsulating coating;

a moisture resistant layer disposed on said reflective layer so as to terminate on said detector substrate second portion adjacent to said reflective layer;

said moisture resistant layer being disposed on said detector substrate second portion to provide a humidity barrier.

[C033] 33. The X-ray detector assembly as in claim 32, wherein said encapsulating coating comprises at least one polymer comprising para-xylylene moieties as structural units.

[C034] 34. The X-ray detector assembly as in claim 33, wherein said para-xylylene moieties are comprised of structural units of unsubstituted para-xylylene moieties.

[C035] 35. The X-ray detector assembly as in claim 33, wherein said para-xylylene moieties are comprised of structural units of substituted para-xylylene moieties.

[C036] 36. The X-ray detector assembly as in claim 33, wherein said para-xylylene moieties are comprised of structural units of both substituted and unsubstituted para-xylylene moieties.

[C037] 37. The X-ray detector assembly as in claim 32, wherein said encapsulating coating is selected from a group consisting of a mono-chloro-poly-para-xylylene material; a di-chloro-poly-para-xylylene material, a poly-para-xylylene material and combinations thereof.

[C038] 38. The X-ray detector assembly as in claim 33, encapsulating coating further comprising:

a first encapsulating coating tier disposed on said scintillator material and said detector substrate first portion;

an inner reflective tier disposed on said first encapsulating coating tier; and

a second encapsulating coating tier disposed on said inner reflective tier.

[C039] 39. The X-ray detector assembly as in claim 38, wherein:

said first encapsulating coating tier is selected from a group of a mono-chloro-poly-para-xylylene material, a di-chloro-poly-para-xylylene material, a para-xylylene material, and combinations thereof;

said inner reflective tier comprises silver (Ag);

said second encapsulating coating tier is selected from a group of said mono-chloro-poly-para-xylylene material, said di-chloro-poly-para-xylylene material, said para-xylylene material and said combinations thereof.

[C040] 40. The X-ray detector assembly as in claim 39, wherein:

said first encapsulating coating tier has a thickness in a range between about 0.7 microns and about 1 micron;

said inner reflective tier has a thickness in a range between about 0.05 microns and about 0.12 microns;

said second encapsulating coating tier has a thickness in a range between about 1 micron and 12 microns.

[C041] 41. The X-ray detector assembly as in claim 32, wherein said reflective layer is selected from a group consisting of silver (Ag), gold (Au), titanium dioxide (TiO₂), and a polyester film with a layer of a pressure sensitive adhesive, and combinations thereof.

[C042] 42. The X-ray detector assembly as in claim 41, wherein said reflective layer comprises a silver layer having a thickness in a range between about 0.05 microns and about 0.15 microns.

[C043] 43. The X-ray detector assembly as in claim 32, wherein said scintillator material comprises a cesium iodide (CsI) material being disposed in a CsI needle structure.

[C044] 44. The X-ray detector assembly as in claim 43, wherein said CsI needle structure further comprises a thallium doping material.

[C045] 45. The X-ray detector assembly as in claim 33, X-ray detector assembly further comprising:

a protective cover;

a protective cover epoxy; and

a detector substrate third portion disposed on said detector substrate;

said protective cover is disposed over said moisture resistant layer and said detector substrate third portion;

said protective cover epoxy is disposed between said protective cover and said moisture resistant layer being disposed over detector substrate second portion; said protective cover epoxy is disposed between said protective cover and said detector substrate third portion;

said encapsulating coating being disposed so that it does not extend over said detector substrate third portion.

[C046] 46. The X-ray detector assembly as in claim 45, wherein said protective cover epoxy comprises a thermoset epoxy material with a curing temperature of less than about 100 degrees C.

[C047] 47. The X-ray detector assembly as in claim 32, said X-ray detector assembly further comprising:

a thin film mask disposed on said reflective layer;

said moisture resistant layer being disposed on said thin film mask.

[C048] 48. The X-ray detector assembly as in claim 47, wherein said thin film mask is selected from a group consisting of aluminum (Al), magnesium fluoride (MgF), diamond-like carbon, boron carbide (B_4C), boron nitride (BNO_2), silicon nitrate ($SiNO_3$), and silicon oxide (SiO).

[C049] 49. The X-ray detector assembly as in claim 33, said X-ray detector assembly further comprising:

a corrosion protection layer;

said corrosion protection layer disposed on said moisture resistant layer so as to terminate on said detector substrate second portion adjacent to said moisture resistant cover.

[C050] 50. The X-ray detector assembly as in claim 49, wherein said corrosion protection layer is selected from a group consisting of gold (Au), acrylic, silicon nitrate ($SiNO_3$), silicon oxide (SiO), aluminum oxide (AlO), aluminum (Al), magnesium fluoride (MgF), diamond-like carbon, boron carbide (B_4C), boron nitride (BNO_2), at least one polymer comprising para-xylylene moieties as structural units, at least one polymer comprising structural units derived from unsubstituted, and at least one polymer comprising substituted para-xylylene moieties.

[C051] 51. The X-ray detector assembly as in claim 49, said X-ray detector assembly further comprising:

a protective cover;

a protective cover epoxy; and

a detector substrate third portion disposed on said detector substrate;

said protective cover is disposed over said corrosion protection layer and said detector substrate third portion;

said protective cover epoxy is disposed between said protective cover and said corrosion protection layer being disposed over detector substrate second portion; said protective cover epoxy is disposed between said protective cover and said detector substrate third portion;

said encapsulating coating being disposed so that it does not extend over said detector substrate third portion.

[C052] 52. The X-ray detector assembly as in claim 33, further comprising:

a planarized adhesive layer disposed to contact said detector substrate at a detector substrate third portion; and

a protective cover; and

a protective cover epoxy;

said protective cover is disposed over said moisture resistant layer and said planarized adhesive layer;

said protective cover epoxy is disposed between said protective cover and said moisture resistant layer being disposed over detector substrate second portion; said protective cover epoxy is disposed between said protective cover and said planarized adhesive layer;

said encapsulating coating being disposed so that it does not extend over said planarized adhesive layer.

[C053] 53. The X-ray detector assembly as in claim 49, further comprising:

a planarized adhesive layer disposed to contact said detector substrate at a detector substrate third portion; and

a protective cover; and

a protective cover epoxy;

said protective cover is disposed over said corrosion protection layer and said planarized adhesive layer;

said protective cover epoxy is disposed between said protective cover and said corrosion protection layer being disposed over detector substrate second portion; said protective cover epoxy is disposed between said protective cover and said planarized adhesive layer;

said encapsulating coating being disposed so that it does not extend over said planarized adhesive layer.

[C054] 54. The X-ray detector assembly as in claim 33, further comprising:

a planarized adhesive layer disposed to contact said detector substrate at a detector substrate third portion;

said moisture resistant layer being disposed on said reflective layer and said detector substrate second portion so as to terminate on a planarized adhesive layer bond area;

said moisture resistant layer, said planarized adhesive layer and said detector substrate third portion being disposed to provide a moisture resistant seal;

said encapsulating coating being disposed so that it does not extend over said planarized adhesive layer bond area.

[C055] 55. The X-ray detector assembly as in claim 54, said X-ray detector assembly further comprising:

a thin film mask disposed on said reflective layer;

said moisture resistant layer being disposed on said thin film mask and said detector substrate second portion so as to terminate on said planarized adhesive layer bond area.

[C056] 56. The X-ray detector assembly as in claim 54, said X-ray detector assembly further comprising:

a protective cover; and

a protective cover epoxy;

said protective cover is disposed over said moisture resistant layer and said planarized adhesive layer;

said protective cover epoxy is disposed between said protective cover and said moisture resistant layer being disposed over both said detector substrate second portion and said detector substrate third portion; said protective cover epoxy is disposed between said protective cover and said planarized adhesive layer.

[C057] 57. The X-ray detector assembly as in claim 54, said X-ray detector assembly further comprising:

a corrosion protection layer;

said corrosion protection layer disposed on said moisture resistant layer so as to terminate on said planarized adhesive layer bond area adjacent to said moisture resistant layer.

[C058] 58. The X-ray detector assembly as in claim 57, said X-ray detector assembly further comprising:

a protective cover; and

a protective cover epoxy;

said protective cover is disposed over said corrosion protection layer and said planarized adhesive layer;

said protective cover epoxy is disposed between said protective cover and said corrosion protection layer being disposed over both said detector substrate

second portion and said detector substrate third portion; said protective cover epoxy is disposed between said protective cover and said planarized adhesive layer.

[C059] 59. An X-ray detector assembly comprising:

a detector substrate;

a planarized adhesive layer disposed on a detector substrate second portion and a detector substrate third portion, a first planarized adhesive layer bond area being disposed over said detector substrate second portion and a second planarized adhesive layer bond area being disposed over said detector substrate third portion;

a scintillator material disposed on a detector matrix array disposed on said detector substrate;

an encapsulating coating disposed on said scintillator material, a detector substrate first portion and said first planarized adhesive layer adhesive bond area;

said encapsulating coating being disposed so as to not extend over said second planarized adhesive layer adhesive bond area;

a reflective layer disposed on said encapsulating coating; and

a moisture resistant layer disposed on said reflective layer so as to terminate on said second planarized adhesive layer adhesive bond area adjacent to said reflective layer;

said moisture resistant layer, said planarized adhesive layer, said detector substrate second portion and said detector substrate third portion, being disposed to provide a moisture resistant seal.

[C060] 60. The X-ray detector assembly as in claim 59, wherein said encapsulating coating comprises at least one polymer comprising para-xylylene moieties as structural units.

[C061] 61. The X-ray detector assembly as in claim 60, wherein said para-xylylene moieties are comprised of structural units of unsubstituted para-xylylene moieties.

[C062] 62. The X-ray detector assembly as in claim 60, wherein said para-xylylene moieties are comprised of structural units of substituted para-xylylene moieties.

[C063] 63. The X-ray detector assembly as in claim 60, wherein said para-xylylene moieties are comprised of structural units of both substituted and unsubstituted para-xylylene moieties.

[C064] 64. The X-ray detector assembly as in claim 59, wherein said encapsulating coating is selected from a group consisting of a mono-chloro-poly-para-xylylene material, a di-chloro-poly-para-xylylene material, a poly-para-xylylene material, and combinations thereof.

[C065] 65. The X-ray detector assembly as in claim 60, encapsulating coating further comprising:

a first encapsulating coating tier disposed on said scintillator material and said detector substrate first portion;

an inner reflective tier disposed on said first encapsulating coating tier; and

a second encapsulating coating tier disposed on said inner reflective tier.

[C066] 66. The X-ray detector assembly as in claim 65, wherein:

said first encapsulating coating tier is selected from a group of a mono-chloro-poly-para-xylylene material, a di-chloro-poly-para-xylylene material, a para-xylylene material, and combinations thereof;

said inner reflective tier comprises silver (Ag);

said second encapsulating coating tier is selected from a group of said mono-chloro-poly-para-xylylene material, said di-chloro-poly-para-xylylene material, said para-xylylene material, and said combinations thereof.

[C067] 67. The X-ray detector assembly as in claim 66, wherein:

said first encapsulating coating tier has a thickness in a range between about 0.7 microns and about 1 micron;

said inner reflective tier has a thickness in a range between about 0.05 microns and about 0.12 microns;

said second encapsulating coating tier has a thickness in a range between about 1 micron and 12 microns.

[C068] 68. The X-ray detector assembly as in claim 59, wherein said reflective layer is selected from a group consisting of silver (Ag), gold (Au), titanium dioxide (TiO₂) and a polyester film with a layer of a pressure sensitive adhesive, and combinations thereof.

[C069] 69. The X-ray detector assembly as in claim 68, wherein said reflective layer comprises a silver layer with a thickness in a range between about 0.05 microns and about 0.15 microns.

[C070] 70. The X-ray detector assembly as in claim 59, wherein said scintillator material comprises a cesium iodide (CsI) material being disposed in a needle structure and said CsI needle structure comprising a thallium material.

[C071] 71. The X-ray detector assembly as in claim 59, wherein said detector substrate second portion and said detector substrate third portion have a combined width with a range between about 3050 microns and about 4850 microns.

[C072] 72. The X-ray detector assembly as in claim 59, said X-ray detector assembly further comprising:

a protective cover; and

a protective cover epoxy;

said protective cover is disposed over said moisture resistant layer and said planarized adhesive layer;

said protective cover epoxy is disposed between said protective cover and said moisture resistant layer being disposed over both said detector substrate second portion and said detector substrate third portion; said protective cover epoxy is disposed between said protective cover and said planarized adhesive layer.

[C073] 73. The X-ray detector assembly as in claim 72, wherein said protective cover epoxy comprises a thermoset epoxy material with a curing temperature of less than about 100 degrees C.

[C074] 74. The X-ray detector assembly as in claim 59, said X-ray detector assembly further comprising:

a thin film mask;

said thin film mask disposed on said reflective layer;

said moisture resistant layer disposed on said thin film mask so as to terminate on said second planarized adhesive layer bond area adjacent to said thin film mask.

[C075] 75. The X-ray detector assembly as in claim 74, wherein said thin mask is selected from a group consisting of aluminum (Al), magnesium fluoride (MgF), diamond-like carbon, boron carbide (B_4C), boron nitride (BNO_2), silicon nitrate ($SiNO_3$) and silicon oxide (SiO).

[C076] 76. The X-ray detector assembly as in claim 59, said X-ray detector assembly further comprising:

a corrosion protection layer;

said corrosion protection layer disposed on said moisture resistant layer so as to terminate on said second planarized adhesive layer bond area adjacent to said moisture resistant layer.

[C077] 77. The X-ray detector assembly as in claim 76, wherein said corrosion protection layer is selected from a group consisting of gold (Au), acrylic, silicon nitrate (SiNO_3), silicon oxide (SiO), aluminum oxide (AlO), aluminum (Al), magnesium fluoride (MgF), diamond-like carbon, boron carbide (B_4C), boron nitride (BNO_2), at least one polymer comprising para-xylylene moieties as structural units, at least one polymer comprising structural units derived from unsubstituted, and at least one polymer comprising substituted para-xylylene moieties.

[C078] 78. The X-ray detector assembly as in claim 76, said X-ray detector assembly further comprising:

a protective cover; and

a protective cover epoxy;

said protective cover is disposed over said corrosion protection layer and said planarized adhesive layer;

said protective cover epoxy is disposed between said protective cover and said corrosion protection layer being disposed over both said detector substrate second portion and said detector substrate third portion; said protective cover epoxy is disposed between said protective cover and said planarized adhesive layer.

[C079] 79. An X-ray detector assembly comprising:

a detector substrate;

a planarized adhesive layer disposed on a detector substrate second portion and a detector substrate third portion;

a first planarized layer adhesive bond area being disposed over said detector substrate second portion and a second planarized layer adhesive bond area being disposed over said detector substrate third portion;

a scintillator material disposed on a detector matrix array disposed on said detector substrate;

a first encapsulating coating tier disposed on said scintillator material, a detector substrate first portion and said first planarized adhesive layer bond area;

an inner reflective tier disposed on said first encapsulating coating tier;

a second encapsulating coating tier disposed on said inner reflective tier;

said first encapsulating coating tier being disposed so as to not extend over said second planarized layer adhesive bond area;

a moisture resistant layer disposed on said second encapsulating coating tier so as to terminate on said second planarized layer adhesive bond area;

said moisture resistant layer, said planarized adhesive layer, said detector substrate second portion and said detector substrate third portion being disposed to provide a humidity barrier.

[C080] 80. The X-ray detector assembly as in claim 79, said X-ray detector assembly further comprising:

a protective cover; and

a protective cover epoxy;

said protective cover is disposed over said moisture resistant layer and said planarized adhesive layer;

said protective cover epoxy is disposed between said protective cover and said moisture resistant layer being disposed over both said detector substrate second

portion and said detector substrate third portion; said protective cover epoxy is disposed between said protective cover and said planarized adhesive layer.

[C081] 81. A method of fabricating an X-ray detector assembly comprising the steps of:

disposing a scintillator material on a detector matrix array disposed on a detector substrate;

disposing an encapsulating coating on said scintillator material and a portion of said detector substrate;

removing said encapsulating coating from said portion of said detector substrate;

disposing a moisture resistant cover over said detector substrate and said encapsulating coating; and

disposing an adhesive material between said detector substrate and said moisture resistant cover so as to form a moisture vapor barrier, wherein said adhesive material is disposed so that it is not in contact with said encapsulating coating.

[C082] 82. A method of fabricating an X-ray detector assembly utilizing an encapsulating coating, said encapsulating coating comprises at least one polymer comprising para-xylylene moieties as structural units, such method comprising the steps of:

disposing a scintillator material on a detector substrate having a plurality of contact pads and a detector matrix array disposed therein so that said scintillator material is in intimate contact with said detector matrix array;

depositing said encapsulating coating over said scintillator material, a detector substrate first portion, a detector substrate second portion, a detector substrate adhesive bond area, said contact pads and a non-active underside of said detector substrate;

removing said encapsulating coating from said detector substrate adhesive bond area, said detector substrate first portion, said detector substrate second portion, said contact pads, and said non-active underside of said detector substrate;

bonding a moisture resistant cover to said detector substrate by disposing an adhesive material between said detector substrate adhesive bond area and a moisture resistant cover adhesive bond area so as to form a moisture vapor barrier.

[C083] 83. The method of claim 82, wherein said step of depositing said encapsulating coating over said scintillator material, said detector substrate first portion, said detector substrate second portion said detector substrate adhesive bond area and said contact pads further comprises the steps of:

disposing a first encapsulating coating tier on said scintillator material said detector substrate first portion, said detector substrate second portion, said detector substrate adhesive bond area, said contact pads and said non-active underside of said detector substrate;

disposing an inner reflective tier on said first encapsulating coating tier; and

disposing a second encapsulating coating tier on said inner reflective tier .

[C084] 84. The method of claim 82, wherein said step of removing said encapsulating coating from said detector substrate adhesive bond area, said detector substrate second portion, said contact pads, and said non-active underside of said detector substrate is performed by a Reactive Ion Etching (RIE) method.

[C085] 85. The method of claim 82, further comprising the steps of:

applying a palladium acetate in range of between about 4 and about 6 weight percent chloroform solution to an external adhesive material surface of said adhesive material, a portion of said detector substrate adhesive bond area, and a portion of said moisture resistant cover adhesive bond area;

nitrogen drying said chloroform solution;

irradiating said chloroform solution with a UV248 excimer laser; and
depositing a boron nickel alloy to form an outer barrier utilizing an
electroless metal processing technique.

[C086] 86. The method of claim 82, further comprising the steps of:

metal sputtering on an external adhesive material surface of said adhesive
material, a portion of said detector substrate adhesive bond area, a portion of said
moisture resistant cover adhesive bond area to form an outer barrier.

[C087] 87. The method of claim 86, further comprising the steps of:

wherein said metal sputtering utilizes is a metal selected from the group
consisting of aluminum, palladium, titanium, and gold.

[C088] 88. The method of claim 82, further comprising the steps of:

depositing an inorganic insulation material on an external adhesive material
surface of said adhesive material, a portion of said detector substrate adhesive bond
area, a portion of said moisture resistant cover adhesive bond area to form an outer
barrier.

[C089] 89. The method of claim 88, wherein said inorganic insulation material is a
diamond like carbon.

[C090] 90. A method of fabricating an X-ray detector assembly utilizing an
encapsulating coating, said encapsulating coating comprises at least one polymer
comprising para-xylylene moieties as structural units, such method comprising the
steps of:

depositing an adhesive material on a detector substrate in a detector
substrate third portion;

planarizing said adhesive material to form a planarized adhesive layer;

depositing a scintillator material onto said detector substrate so that said scintillator material intimately contacts a detector matrix array;

depositing said encapsulating coating onto said scintillator material, said detector substrate first portion, a detector substrate second portion, said planarized adhesive layer, a plurality of contact pads, and a non-active underside of said detector substrate;

depositing a reflective layer onto said encapsulating coating covering said scintillator material and said detector substrate first portion;

removing said encapsulating coating from said detector substrate second portion, said planarized adhesive layer, said contact pads, and said non-active underside of said detector substrate;

depositing a moisture resistant layer on said reflective layer; and

terminating said moisture resistant layer on said detector substrate second portion adjacent to said reflective layer so as to form a humidity barrier between said moisture resistant layer and said detector substrate second portion.

[C091] 91. The method of claim 90, wherein said step of depositing said encapsulating coating onto said scintillator material, said detector substrate first portion, said detector substrate second portion, said planarized adhesive layer, said plurality of contact pads, and said non-active underside of said detector substrate further comprises the steps of:

disposing a first encapsulating coating tier on said scintillator material, said detector substrate first portion, said detector substrate second portion, said planarized adhesive layer, said contact pads, and said non-active underside of said detector substrate;

disposing an inner reflective tier on said first encapsulating coating tier; and

disposing a second encapsulating coating tier on said inner reflective tier.

[C092] 92. The method of claim 90, wherein said step of removing said encapsulating coating from said detector substrate second portion, said planarized adhesive layer, said contact pads, and said non-active underside of said detector substrate is performed by a Reactive Ion Etching (RIE) method.